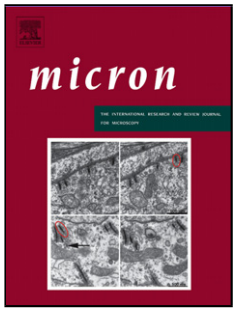


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# Exosomes: ultrastructural evidence in epithelial cells of Malpighian tubules

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## Highlights

- **Exosomes are small vesicles released by most cell types and are involved in cell communication**
- **Intraluminal vesicles influence intercellular trafficking in cell of Malpighian tubules**
- **Physiological and pathological processes in insect cells can involve exosomes**

## Abstract

Exosomes in Malpighian tubules of *Calathus fuscipes* (Coleoptera: Carabidae) were investigated under transmission electron microscopy. Ultrastructural analyses showed a wide number of multivesicular bodies localized in the apical portion of epithelial cells. Each multivesicular body encloses from 15 to 80 intraluminal vesicles (about 50 nm in diameter), originating through inward budding of late endosomes that package molecules into luminal membrane-bound structures. Subsequently they are released as exosomes through exocytosis of multivesicular bodies into the extracellular space after fusion with plasma membrane. Our results are the base for further investigation on the role of exosomes in functional polarization of tubule cells and on cell-to-cell communication in insects.

**Keywords:** exosomes, multivesicular bodies, endosomes, carabid beetles